CLAIMS

What is claimed and desired to be covered by Letters Patent is:

1. A hand-holdable unit adapted to pump air into vehicle tires comprising:

a) a housing unit having

(1) a first end,

(2) a second end,

(3) a longitudinal axis extending between the first end and the second end of said housing unit,

(4) a first side wall,

(5) a second side wall,

(6) a transverse axis extending between the first side wall and the second side wall of said housing unit,

(7) a first side surface,

(8) a second side surface,

(9) a thickness extending between the first side surface and the second side surface of said housing unit,

(10) a handle on the first end of said housing unit,

(11) a display window on the first side surface,

(12) a plurality of control buttons on the first side surface,

(13) a plurality of indicator lights on the first side surface,

(14) an on/off button on the handle,

(15) a light on the second end of said housing unit,

(16) a hollow interior in said housing unit,

(17) an air-dispensing opening defined through the second end of said housing unit,

(18) a first operating opening defined through the second end of said housing unit adjacent to the air-dispensing opening, and

(19) a second operating opening defined through the second end of said housing unit adjacent to the air-dispensing opening;

b) an air-dispensing nozzle unit on the second end of said housing unit and including

(1) an O-ring seal located adjacent to the air-dispensing opening,

(2) a front plate located adjacent to the O-ring seal, the front plate including a first actuator element leg-accommodating hole

located to be adjacent to and aligned with the first operating opening defined through the second end of said housing unit and a second actuator element leg-accommodating hole located to be adjacent to and aligned with the second operating opening defined through the second end of said housing unit,

(3) fasteners attaching the front plate to the second end of said housing unit,

(4) a nozzle housing mounted on the front plate and having

(A) a dispensing end, the dispensing end of the nozzle housing having an air-dispensing opening defined therethrough,

(B) an inlet end located adjacent to and in fluid communication with the air-dispensing opening defined through the second end of said housing unit,

(C) a longitudinal axis extending between the dispensing end of the nozzle housing and the inlet end of the nozzle housing and being co-linear with the longitudinal axis of said housing unit when said air-dispensing nozzle unit is in place on

said housing unit,

(D) an air-dispensing passage defined in the nozzle housing and fluidically connecting the air-dispensing opening in the dispensing end of the nozzle housing to the inlet end of the nozzle housing,

(E) knurling grooves on said nozzle housing, and

(F) a spider support frame element mounted on the nozzle housing in the air-dispensing passage adjacent to the dispensing end of the nozzle housing, the spider support frame including a hole defined therethrough and centered on the longitudinal axis of the nozzle housing, the hole defined through the spider support frame being fluidically connected to the air-dispensing passage defined in the nozzle housing, and

(5) a wishbone actuator element movably located inside the nozzle housing, the wishbone actuator element having

(A) a body located on the longitudinal axis of the nozzle housing and extending

through the hole defined through the spider support element and located adjacent to the air-dispensing passage and adjacent to the air-dispensing opening defined in the dispensing end of the nozzle housing, the body of the wishbone actuator element including a forward end and a rear end,

(B) a first leg having a first end attached to the rear end of the body of the wishbone actuator element and having a second end which extends through the first actuator element leg-accommodating hole in the front plate and through the first operating opening defined through the second end of said housing unit,

(C) the wishbone actuator element moving in the nozzle housing between a first position with the forward end of the body extending out of the air-dispensing opening in the dispensing end of the nozzle housing and in a position that is adapted to engage and operate a valve opening element of a tire valve of a

tire of a vehicle and a second position having the forward end of the body located adjacent to the spider support element, the second end of the first leg of the wishbone actuator element being located inside said housing unit when the wishbone actuator element is in the second position,

(D) a first spring abutment on the first leg of the wishbone actuator element adjacent to the second end of the first leg,

(E) a first spring on the first leg of the wishbone actuator element and having a first end abutting the first spring abutment and a second end abutting the front plate, the first spring biasing the wishbone actuator element toward the first position,

(F) a second leg having a first end attached to the rear end of the body of the wishbone actuator element and having a second end which extends through the second actuator element leg-

accommodating hole in the front plate and through the second operating opening defined through the second end of said housing unit,

(G) a second spring abutment on the second leg of the wishbone actuator element adjacent to the second end of the second leg, and

(H) a second spring on the second leg of the wishbone actuator element and having a first end abutting the second spring abutment and a second end abutting the front plate, the second spring biasing the wishbone actuator element toward the first position;

c) a tapered adapter element adapted to be accommodated through the air-dispensing opening in the dispensing end of the nozzle housing, said adapter element having a first end which is smaller than the air-dispensing opening and a second end that is larger than the air-dispensing opening and being adapted to move between a first position relative to the nozzle housing with the first end of the adapter element located inside

the nozzle housing and a second position relative to the nozzle housing in which the adapter element is located outside the nozzle housing, the adapter element including a side wall connecting the first end of the adapter element to the second end of the adapter element, the side wall of the adapter element being in fluid-occluding contact with the nozzle housing adjacent to the air-dispensing opening of the nozzle housing when said adapter element is in the first position thereof, the adapter element further including an air passage fluidically connecting the first end of the adapter element to the second end of the adapter element, the air passage of said adapter element being fluidically connected to the air-dispensing passage in said nozzle unit when said adapter element is in the first position thereof, the second end of said adapter element being adapted to accommodate the valve on the tire of an automotive vehicle and to place the air passage of said adapter element in fluid communication with the inside of the tire to place the interior of the tire in fluid communication with the air-dispensing passage of said nozzle unit when said

adapter element is in the first position and the wishbone actuator element is in the first position thereof;

d) an air control unit fluidically connected to the air-dispensing passage of said nozzle unit and including

(1) a power source in said housing unit,

(2) a control circuit in said housing unit, the control circuit including an internal memory and an internal power source,

(3) a display unit in said housing unit adjacent to the display window of said housing unit, the display unit being electrically connected to the control circuit to be activated by the control circuit to indicate operations being performed by the control circuit,

(4) the control buttons on said housing unit being electrically connected to the control circuit to control operations of the control circuit according to settings associated with the control buttons,

(5) the indicator lights on said housing unit being electrically connected to the control unit to be activated according to operations

being performed by the control circuit,

(6) a push button on/off control button on the second end of said housing unit adjacent to the first actuator element leg-accommodating hole in the front plate and adjacent to the first operating opening defined through the second end of said housing unit, the push button on/off control button being located to be abuttingly engaged by the second end of the first leg of the wishbone actuator element when the wishbone actuator element is in the second position thereof, the push button on/off control button moving between an "on" condition when the second end of the first leg of the wishbone actuator element is in abutting contact with the on/off control button and an "off" condition when the second end of the first leg of the wishbone actuator element is spaced apart from the on/off control button, the on/off control button electrically connecting the power source to the control circuit when the on/off control button is in the "on" condition,

(7) an air flow control fluid circuit on said

housing unit and including

(A) a fluid pump in said housing unit, the fluid pump being electrically connected to the control circuit to be electrically connected to the power source via the control circuit and to be activated according to control of the control circuit, the fluid pump including an air outlet located inside said housing unit,

(B) a control valve including an air inlet fluidically connected to the air outlet of the fluid pump, an air outlet, a control valve element that moves between a fluid passage position fluidically connecting the air outlet of the control valve to the air inlet of the control valve and a fluid-occluding position in which the control valve element is in a position preventing fluid communication between the air inlet of the control valve and the air outlet of the fluid control valve, the control valve further including a spring element which biases

the control valve element towards the fluid-occluding position and a control valve element moving unit electrically connected to the control circuit to be controlled thereby and connected to the control valve element to move the control valve element against the bias of the spring element into the fluid passage position when activated by the control circuit, and

(C) a one-way valve fluidically interposed between the control valve and the air-dispensing passage of said nozzle unit and positioned to prevent fluid flow from the air-dispensing passage of said nozzle unit towards the control valve and to permit fluid flow from the control valve towards the air-dispensing passage of said nozzle unit, the one-way valve including a pressure sensor which is electrically connected to the control circuit to activate the control circuit to stop operation of the fluid pump when fluid pressure in the one-way valve

reaches a pressure level that has been set using one of the control buttons; and

e) a light circuit which includes the on/off button on the handle of said housing unit, the power source and the light on the second end of said housing unit, the on/off button on the handle of said housing unit electrically connecting the power source to the light on the second end of said housing unit when in an "on" position.

2. The unit as described in claim 1 wherein said power source includes a rechargeable battery, and said housing unit further includes battery recharging contacts thereon.

3. The unit as described in claim 1 wherein the control circuit includes a memory circuit which activates one of the indicator lights after a pre-set time period, even when the power source is not electrically connected to the control circuit.

4. The unit as described in claim 1 further including a hose fluidically connected to the fluid pump.

5. The unit as described in claim 4 further including an air chamber fluidically connected to the hose.

6. A hand-holdable unit adapted to pump air into a tire of a vehicle comprising:

a) a housing unit having a handle and an air-dispensing opening defined therein;

b) an air-dispensing nozzle unit on said housing unit including

(1) a front plate on said housing unit,

(2) a nozzle housing mounted on the front plate and having an inlet end in fluid communication with the air-dispensing opening on said housing unit and an outlet end in fluid communication with the inlet end of the nozzle housing,

(3) a wishbone actuator element in said nozzle unit and movable between a first position and a second position and including

(A) a body which is located adjacent to the outlet end of the nozzle housing,

(B) a first leg connected to the body and extending into said housing unit,

(C) a second leg connected to the body, and

(D) a spring element mounted on the wishbone actuator element in a manner which biases the wishbone actuator element toward the first position;

c) an adapter element which is sized and adapted to be received in said nozzle unit adjacent to the outlet end of said nozzle unit and which is adapted to be in fluid communication with a valve on a tire of a vehicle;

d) an air control unit which includes

(1) a power source in said housing unit,

(2) a control circuit in said housing unit and which includes an internal memory and an internal power supply,

(3) a push button on/off control button on said housing unit and positioned to be engaged by the first leg of the wishbone actuator element when the wishbone actuator element is in the second position, the push button on/off control button electrically connecting the control circuit to the power source when the push button on/off control button is in an "on" condition, the push button on/off control button being placed in the "on"

condition when engaged by the first leg of the wishbone actuator element, and

(4) an air flow control circuit on said housing unit and which includes

(A) a fluid pump electrically connected to the control circuit to be activated by the control circuit,

(B) a control valve that is electrically connected to the control circuit and which moves between a fluid flow position and a fluid-blocking position and which includes a biasing element biasing the control valve toward the fluid blocking position, the control valve further including an element that is electrically connected to the control circuit and which moves the control valve against the bias of the biasing element toward the fluid flow position when activated by the control circuit when the control circuit is connected to the power source by the push button on/off control button,

(C) a one-way valve fluidically interposed

between the control valve and the outlet end of the nozzle housing and oriented to permit fluid flow toward the outlet end of the nozzle housing and to prevent fluid flow from the outlet end of the nozzle housing toward the control valve,

(D) a pressure sensor in the one-way valve and electrically connected to the control circuit to activate the control circuit to disconnect the pump from the power source when a pre-set pressure is sensed in the one-way valve by the pressure sensor, and

(E) the fluid connection between the one-way valve and the control valve and the pump and the outlet end of the nozzle housing permitting flow of fluid from the fluid pump to the outlet end of the nozzle housing and via the outlet end of the nozzle housing to a tire valve of a vehicle tire and via the tire valve to the tire when the fluid pump is actuated by the wishbone actuator via the control circuit when fluid pressure in the one-

way valve is below the pre-set pressure; and

e) a light circuit on said housing unit, said light circuit including a light on said housing unit and a switch on the handle which electrically connects the light on said housing unit to the power source when the switch on the handle is in an "on" position.

7. The device as described in claim 1 wherein the control circuit includes a reminder circuit.